Modulation of fish fibroblast proliferation with glucan and hydrogen peroxide during wound healing.

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Modulation of fish fibroblast proliferation with β-glucan and hydrogen peroxide during wound healing.

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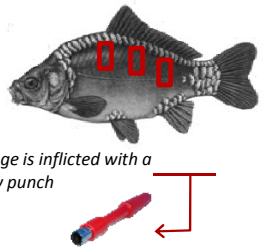
Introduction

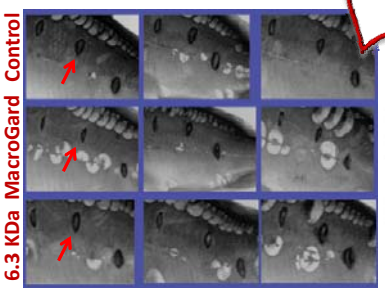
Wound healing and tissue regeneration are essential mechanisms to ensure the survival and health of any organism. Although several diseases and even mechanical injury can damage fish tissues, only a few studies have been directed to tissue regeneration and modulation of cell proliferation during wound healing in fish. Mammalian studies suggested the importance of fibroblasts, leukocytes and radical oxygen species (ROS) during tissue regeneration processes. This study is directed to their fish counterparts and their involvement during wound healing in fish.

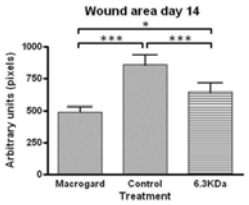
Can we modulate tissue regeneration in fish using different β-glucans?



Damage is inflicted with a biopsy punch

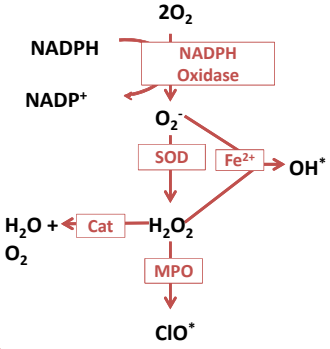
1. β-glucans bath [0.1mg/L], 14 days.
   - MacroGard®
   - PromOat 6.3KDa
2. Multispectral image (VideometerLab)



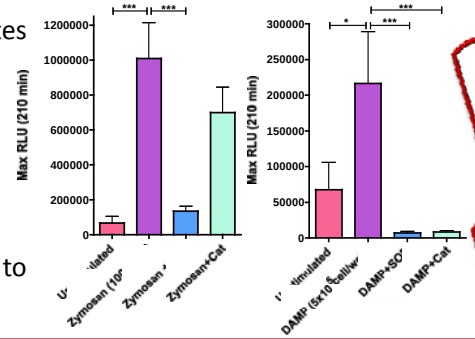


Yes, we can...

Which ROS are produced by the immune-system after recognition of β-glucans or a wound?



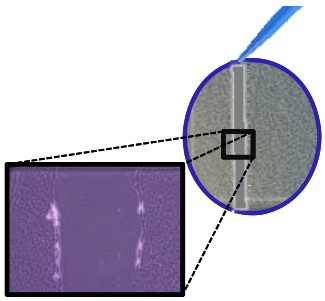
1. Head kidney derived leukocytes were cultured for 6 days
2. Stimulation of Leukocytes
   - Zymosan (100 µg/ml)
   - DAMPs (5X10^5 cells/well)
   - SOD (O_2^- scavenger)
   - Catalase (H_2O_2 scavenger)
3. Real time luminol assay was used to measure ROS.



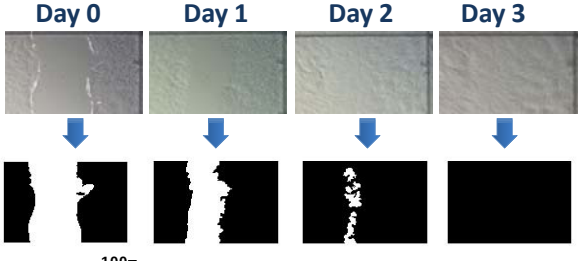
DAMP stimulation induces H_2O_2

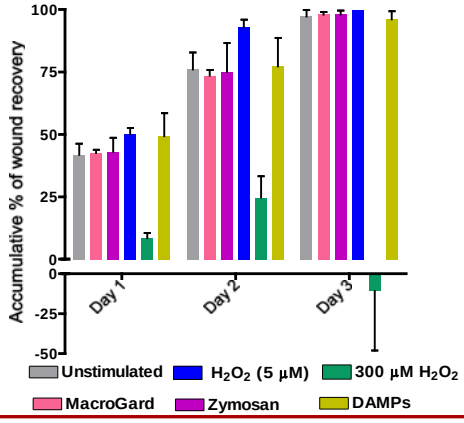
β-glucans stimulation induces O_2^-

Do β-glucans and H_2O_2 modulate directly fibroblast proliferation during wound healing?



1. Culture Stimulation (daily)
   - MacroGard® (100 µg/ml)
   - Zymosan (100 µg/ml)
   - H_2O_2 (5 µM, 10 µM, 300 µM)
   - DAMPs (5X10^5 cells/well)
2. Image analysis (MatLab)





❖H_2O_2 can influence the fait of tissue regeneration
❖ β-glucan did not show a direct effect on fibroblast proliferation
❖Interaction with components of the fish immune system are required to induce fibroblast proliferation using β-glucans

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